

CHROMOSOME NUMBERS IN SOME SOUTH AFRICAN SPECIES OF *LINUM* L. (LINACEAE)

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ABSTRACT

Chromosome numbers of five (of fourteen) species of section *Linopsis* of the genus *Linum* of South Africa were counted.

On gross morphological bases the South African species have been thought to be more or less intermediate between species of the Mediterranean region and those of the New World. They are characterized by base chromosome numbers of $x = 9$ (Old World) or $x = 18$ (New World) and it was thought that the chromosome number of the South African species would likely be one or the other. The South African species examined, however, prove to have a base chromosome number of $x = 15$ and some doubt is raised as to their exact position in the section.

UITTREKSEL

CHROMOSOOMGETALLE IN SOMMIGE SUID-AFRIKAANSE SOORTE VAN *LINUM* L. (LINACEAE)

Die chromosoomgetalle van vyf (uit veertien) soorte van die seksie *Linopsis* van die genus *Linum* van Suid-Afrika is bepaal.

Op 'n uiterlike morfologiese basis is gemeen dat die Suid-Afrikaanse soorte min of meer intermediêr tussen die soorte van die Middellandse See en dié van die Nuwe Wêreld is. Hulle word gekenmerk deur basiese chromosoomgetalle van $x = 9$ (Ou Wêreld) of $x = 18$ (Nuwe Wêreld) en is dit verwag dat die Suid-Afrikaanse soorte waarskynlik dieselfde as die een of ander sal wees. Die Suid-Afrikaanse soorte wat ondersoek is het egter 'n basiese chromosoomgetal van $x = 15$ en bestaan daar dus nou onsekerheid van hulle presiese plek in die seksie.

Key words: *Linum*, Linaceae, South Africa, flax, chromosome numbers.

INTRODUCTION

The author has been occupied with the classification of the section *Linopsis*, of the genus *Linum*, which includes many of the yellow-flowered species of both Old and New Worlds. Among other things, the chromosome numbers of many of the species, except those of South Africa, have become known.

The section ranges from southern Europe to eastern and southern Africa and to North and South America, with a single outlier in India and Sri Lan

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ka. The species of the Mediterranean are mostly diploid, with $n = 9$ or 10 . One small group, the subsection *Dichrolinum*, which includes *L. suffruticosum* L., *L. tenuifolium* L. and their allies, includes taxa with $n = 9$, 18 and 36 . The small subsection *Halolinum*, with *L. trigynum* L. and the heterostylous species *L. tenue* Desf. and *L. maritimum* L., is characterized by $n = 10$. They differ from others in the section in having linear stigmas and thus appear to be out of the main line of evolution in the section, other species of which have capitate stigmas. The latter thus far have all been found to have $x = 9$. Mediterranean species, such as *L. setaceum* Brot., and *L. strictum* L., for example, have $n = 9$, while *L. volkensii* Engl., of eastern Africa, is interpreted as a hexaploid with $n = 27$ (Lewis, 1964). In South America the eight species (of fourteen) thus far examined have been found to have $n = 18$ or 36 (Mildner and Rogers, 1978), while the base number for the numerous North American species of the section also proves to be $x = 18$ (Rogers, 1969).

The South African species are morphologically very similar to species of the New World and, therefore, they were expected to follow the same pattern and it would mainly be a matter of discovering whether they might still retain the primitive diploid number of $n = 9$ or the tetraploid number of $n = 18$ of the apparently closely allied New World species. Earlier reports (in Darlington and Wylie, 1955) of *L. africanum* having $n = 15$ or 16 were not given much credence, since seed of African-grown plants of *L. usitatissimum* L., the cultivated flax, which is said to have these chromosome numbers, is frequently distributed under the name "*L. africanum*".

MATERIAL AND METHODS

In the early part of 1982, the author had the opportunity to collect some material of several South African species, all from the Cape Province. They included *Linum acuticarpum*, *L. africanum*, *L. comptonii*, *L. gracile* and *L. heterostylum*. Flower buds were collected and preserved in Carnoy's fluid. Anthers were later squashed in acetocarmine and chromosomes of first or second meiotic division examined.

Voucher specimens are deposited in the herbarium of Wayne State University (WUD); duplicates are presently being prepared for distribution to the major herbaria of South Africa.

RESULTS

Chromosomes of all the species of section *Linopsis* examined thus far (approximately fifty species) have proved to be very small, averaging about 2μ in length at first metaphase of meiosis. Those of South African species

prove to be no exception and so no attempt has been made to discern details of chromosome structure and only numbers of chromosomes were determined. The following results were obtained:

Linum acuticarpum Rogers $n = 15$. Roadside, ca 1 km west of the bridge over the Palmiet R., along R 44, Caledon District. Rogers 13704, 19 Feb., 1982.

Linum africanum L. $n = 29$. Roadside, Heuningkloof, near Gordon's Bay, Somerset West District. Rogers 13683, 1 Feb., 1982.

Linum comptonii Rogers $n = 15$. Moist soil, Hangklip, Caledon District. Rogers 13693, 10 Feb., 1982.

Linum gracile Planch. $n = 15$. Half way up the south slope of Outeniquas Pass, north of George, George District. Rogers 13696, 13 Feb., 1982.

Linum heterostylum Rogers $n = 15$. (1) Geelrug on Rietfontein Private Nature Reserve, Bredasdorp District. Rogers 13684, 2 Feb., 1982. (2) Near De Hoop Provincial Farm, near Bredasdorp, Bredasdorp District. Rogers 13685, 3 Feb., 1982. (3) Slopes, 2–3 km from Barrydale toward Tradouw Pass, Swellendam District. Rogers 13694, 11 Feb., 1982.

DISCUSSION AND CONCLUSIONS

Clearly the South African species, at least insofar as chromosome counts have now been made (there are nine additional species which have not been examined), have a base number of $x = 15$ and are not direct intermediates between the Mediterranean and the New World species of the section. *Linum africanum* is a variable species, of which the plants examined are somewhat different from the Linnaean type. The chromosome number of the population sampled is almost certainly an aneuploid derivative of the number $n = 30$.

Very possibly *Linum mysurense* Heyne ex Benth., of India and Sri Lanka, is related most closely to South African species. It is rather distantly disjunct from any other species of the section, except for species such as *Linum strictum* L. and *L. trigynum* L., which in recent times have become widely adventive, and it has been distinguished from all other Old World species of the section in having a chromosome number of $n = 30$ (Rogers, 1975). Until the South African species were examined no other Old World species of the section were known which might be derived from a base number of $x = 15$.

Examination of additional species, especially *L. thunbergii* Eckl. & Zeyh. which links, geographically and morphologically, species of east Africa with those of South Africa, will very possibly throw some further light on the relationships of the latter to others on the continent as well as to those of the New World.

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